UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/812,027 | 03/19/2001 | Bharat Shivkumar | IR-1881 | 4072 |

2352 7590 08/10/2004

OSTROLENK FABER GERB & SOFFEN
1180 AVENUE OF THE AMERICAS
NEW YORK, NY 100368403

| EXAMINER | |
|---|---|
| MITCHELL, JAMES M | |
| **ART UNIT** | **PAPER NUMBER** |
| 2813 | |

DATE MAILED: 08/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/812,027 | SHIVKUMAR ET AL. | |
| | Examiner | Art Unit | |
| | James M. Mitchell | 2827 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on *23 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-3,5,6,9-14,16 and 18-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1,11 and 14* is/are allowed.

6)☒ Claim(s) *2,3,5,6,9,10,12,13,16 and 18-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1 The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 2 and 3, 5, 12, 13, 15, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baba (U.S. 6,071,755) in combination with Tamaki (U.S. 6,157,080).

3. Baba (Fig 20) discloses (cl. 2) an MCM device comprising a flat thin insulation substrate (34) having parallel top and bottom surfaces; a plurality of laterally displaced conductive vias (not labeled) extending between said top and bottom surfaces; a flip chip semiconductor die (31) having top and bottom surfaces; and an insulation cap (41, i.e. resin material) covering said die and covering the top surface of said substrate; (cl.5) and at least one passive component (53) which is beneath said insulation cap has at least one dimension (i.e. length) which is longer than its other dimensions (i.e. height), said passive component being connected to selected ones of said plurality of vias (i.e. contacting via) and being mounted on said first surface of said substrate with said at least one dimension disposed perpendicular to said first surface of said substrate with electrodes (not shown; i.e. in contact with item 32) on the bottom with its contact (32) on said die bottom surface; (cl. 3) along with and a second flip chip (31) semiconductor die having top and bottom surface and having at least an electrode (i.e. first electrode on bottom portion of chip) bottom surfaces with the electrode connected

to respective ones of said plurality of vias; (cl. 13, 15,16, 19) with solder balls (40) connected to the bottoms of said conductive via; (cl. 12) wherein the insulation cap has a peripheral, outer edge and therefore a rim surrounding an interior portion of said substrate, which receives the outer an outer peripheral edge of said substrate (i.e. top surface of substrate contact bottom portion of cap).

4. Baba does not appear to show at least second electrodes on said top surface or said second electrodes having contacts on said die bottom surface connected to respective ones of said plurality of vias.

5. Tamaki (Fig 7E) utilizes first and second electrodes (3,4) on said top and bottom surfaces and said first and second electrodes having contacts (8,6) on said die bottom surface connected to respective ones of said plurality of inherent vias (i.e. pads 7, 30 connected).

6. It would have been obvious to one of ordinary skill in the art to incorporate first electrodes on said top surface of the dies to be connected with contacts on said die bottom surface that is connected to respective ones of said plurality vias, in order to increase density without increasing height of the package as taught by Tamaki (Col. 15, Lines 36-44).

7. Claims 6, 9, 10,18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baba et al. (U.S. 6,071,755) and Tamaki (U.S. 6,157,080) as applied to claims 2 and 5 and further in combination with Nakamichi (JP 410335544).

8. Neither Baba nor Tamaki appear to show said insulation cap with a plurality of spaced fins extending from a free surface thereof such that the passive component is between fins.

9. Nakamichi (Fig 1) utilizes an insulation cap (5) with a plurality of spaced fins (6,7) extending across the top outermost perimeter of an insulation cap/mold such that fins extend from a free surface thereof (i.e. outer perimeter of resin not in contact with anything, alternately area of cap beyond chip) and a component is between fins.

10 It would have been obvious to one of ordinary skill in the art to incorporate spaced fins in the insulation cap, such that fins extend from a free surface thereof, such that the passive component is disposed laterally between a respective pair of fins in order to provide high heat dissipation as taught by Nakamichi (English Abstract).

11. Claims 13 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baba et al. (U.S. 6,071,755) and Tamaki (U.S. 6,157,080) in combination with Glenn (U.S. 6,586,667)

12. Baba and Tamaki disclose the elements stated in paragraphs 3-6 of this office action, but do not appear to show that the insulation cap's peripheral rim and outer peripheral edge of said substrate have cooperating projections and depressions to define a mold lock.

13. However Glenn utilize rims and substrate having cooperating projections and depressions to define a mold locks.

14. It would have been obvious to one of ordinary skill in the art to modify the cap and substrate of Baba to incorporate a cap with projecting member extending from its rim along with the substrate having depressions in order to enhance mold lock as taught by Glenn (Col. 9, Lines 8-19).

### *Allowable Subject Matter*

15. Claims 1, 11, and 14 are allowable.

16. The following is a statement of reasons for the indication of allowable subject matter: the prior art does not disclose or make obvious forming first and second electrodes on a top and bottom surface of a chip with a moldable conductive electrode extending over the top of a substrate, a uppermost surface of the die and in contact with vias including all the limitations of the independent claim, wherein the electrode as indicated by applicant in its arguments filed April 24, 2003 forms an electrical connection, such that it is consistent with the word electrode.

### *Conclusion*

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yamaguchi (U.S. 6,392,294), Eskildsen (U.S. 5,336,456) and Kanada et al. (U.S. 5,302,852).

The pertinent art further evidences that the claimed mold lock technique was well known at the time the invention was made through its use of various types of projections and depressions in the substrate and mold to enhance mold lock.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 10:30-8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571) 272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jmm
August 4, 2004

DAVID ZARNEKE
PRIMARY EXAMINER
8/9/04